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United States Department of Agriculture
Bureau of Entomology and Plant Quarantine

A NEW REMEDY FOR THE PREVENTION AND TREATMENT OF
SCREWWORM INFESTATIONS OF LIVESTOCK 1/

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For a number of years there has been a great need among owners of large numbers of domestic animals in the screwworm-infested area of the United States for an efficient remedy which combines materials that will kill screwworms infesting wounds and protect susceptible animal tissues against infestation. Previous recommendations by the Department of Agriculture have required the use of one material to kill the maggots in the wound and a second to prevent reinfestation. Where large numbers of animals are to be treated, this method is time-consuming and leads to carelessness which results in failure to kill all the worms.

Research by the Bureau of Entomology and Plant Quarantine during 1940 and 1941 has developed a remedy which, when applied to infested wounds, is efficient in rapidly killing all screwworms in a wound. At the same time this remedy gives as good protection to all wounds against subsequent attack as materials heretofore recommended for this purpose, or even better protection. 2/

The remedy is relatively inexpensive and consists of a correct compounding of the two principal materials at present advocated by the Department of Agriculture for the treatment and prevention of screwworm cases.

1/ This remedy has not been tested throughout the screwworm-infested area of the United States, but experiments conducted in Texas indicate that it can be used generally throughout the Southwest.

2/ Research is under way on a number of different materials and formulas that show promise in screwworm control; however, experimental results with the mixture described herein have been so satisfactory that it has been decided to give this formula to the public and in the future to make such changes in the recommendations as the later results may warrant.

Preparation

The remedy known as Formula (or Smear) No. 62 is composed of the following ingredients:

Diphenylamine <u>3/</u> (technical grade) - -	3-1/2	parts by weight
Benzol <u>3/</u> (commercial) - - - - -	3-1/2	parts "
Turkey red oil (pH-10 or neutral) - -	1	part "
Lamp black <u>4/</u> - - - - -	2	parts "

The diphenylamine is dissolved in the benzol, preferably by placing the two substances together and allowing them to stand 12 or 24 hours. In no event should the dissolving of the diphenylamine in benzol be attempted by heating over an open flame. Benzol is highly flammable and should be kept away from flames and lighted cigarettes or cigars. If heat is used to hasten solution, the container holding the benzol and diphenylamine may be placed in a vessel of hot water, the benzol container being left uncorked until the diphenylamine is dissolved.

After the diphenylamine is dissolved the turkey red oil is added and the mixture thoroughly shaken. The lamp black is then stirred in gradually and the mixing continued until the compound attains a smooth, even texture of about the consistency of molasses. It is then ready for use.

Use of Remedy on Wounds

The remedy is best applied with a 1-inch paint brush.

In treating an animal infested with screwworms, the material is swabbed into the wound, care being taken that it is pushed well into all the pockets made by the maggots and painted around the wound where blood and wound exudate have made the surrounding tissue attractive to flies and susceptible to infestation or to fly blows.

3/ Diphenylamine and benzol are two substances recommended by the Department of Agriculture in Bureau of Entomology and Plant Quarantine Circular E-481 for the treatment and prevention of screwworm infestations. In this formula these substances are combined for greater efficiency.

4/ The quantity of lamp black necessary to give the proper consistency to the smear will vary somewhat with the grade used. The grade of lamp black used in the formula is that ordinarily sold by lumber yards and paint stores for tinting paints. Besides imparting the proper texture to the smear, lamp black appears to increase the killing action of benzol and to impart a greater efficiency to diphenylamine for protecting the wound against infestation.

It is not necessary to remove the dead worms from the wound, but most of the larger dead worms may be picked or wiped out with the brush if desired. If the worms are removed the wound should be treated again with the smear before the animal is released.

For protecting uninfested wounds, such as those caused by shear cuts, castrations, dehorning, and docking, it is sufficient to cover the raw tissues and surrounding area thoroughly with a coating of the smear. In treating castration wounds some of the material should be pushed slightly into the openings of both sides of the scrotum.

This remedy kills screwworms quickly, and after its application large numbers of them soon drop out of the wound, carrying a considerable amount of the protective chemical with them. For this reason it is indicated to be a good practice to apply a second treatment from 24 to 48 hours after the first one to insure a proper coating of the wound surface. Thereafter, under average conditions, regular treatments twice each week should be given until the wound is healed. It is especially recommended that infested animals be kept in a hospital pasture when this schedule of treatment is followed. When flies are unusually active and abundant more frequent treatments may be necessary.

This material has been applied to wounds on several hundred sheep, goats, and cattle, and no harmful effects have been observed. Furthermore, in tests in which large doses of the mixture, as well as diphenylamine alone, were applied to sheep and goats, and in which Dr. W. C. Mitchell of the Bureau of Animal Industry cooperated, no ill effects whatever were apparent.

This smear will cost approximately \$1.50 per gallon, and 1 gallon will treat from 200 to 250 wounds one time.

Precautions in Preparing and Using Screwworm Smear No. 62

1. Prepare the remedy well away from open flames and do not have lighted cigarettes or cigars around during the process.

2. Benzol, in the form in which it occurs in the smear, is highly volatile and will evaporate quickly from the smear if left in an open container. It is therefore advisable that the smear be kept tightly covered in a cool place when not in use. It is also recommended that only an amount necessary for a few days' use be removed at a time from the larger supply container. Even when animals are actually being treated the container should be kept covered as much as possible. In case the smear, through evaporation, becomes too thick for easy application, an additional amount of benzol may be stirred in to bring it back to its original consistency.



3. When infestations located near the eyes are being treated, care should be taken not to get an excessive amount of the smear into the unaffected parts of the eye. If this is done accidentally it is advisable to wash the eye immediately with plain water, as the material is irritating to the eyes.

4. Do not add oil, grease, or any other substances to the formula, or its efficiency will be greatly impaired, if not entirely destroyed.

Use of Remedy for Fleece Worms

Preliminary tests on sheep infested with fleece worms, or wool maggots, show that Formula No. 62 is efficient in killing these worms and gives a considerable measure of protection against reinfection.

The material is applied to the affected part and well rubbed into the wool with a brush.

Source of the Material

For the information of those who wish to purchase the ingredients for the mixing of this smear there is given below a list of companies which manufacture them. No claim is made that the list is complete, nor is any guarantee here expressed or implied for the products of the companies listed.

Diphenylamine should be obtainable from the larger wholesale drug companies in screwworm-infested territory. It is manufactured by the following companies:

E. I. Du Pont de Nemours & Company, Inc., Wilmington, Del.
Lederle Laboratories, Inc., 30 Rockefeller Plaza, New York, N. Y.
Eastman Kodak Company, Chemical Sales Division, Rochester, N. Y.
The Dow Chemical Company, Midland, Mich.

Turkey red oil is manufactured by the following companies:

Apex Chemical Co., Inc., 200-214 So. First St., Elizabethport,
N. J.

L. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y.

Lamp black is manufactured by the following companies:

General Carbon Co., Los Angeles, Calif.
The L. Martin Co. (Germantown Eagle or Velvet Brand), Tacony, Pa.
Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York,
N. Y.